

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 11

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RONG-WU CHIEN
and KUO-CHANG WU

Appeal No. 1998-1548
Application No. 08/660,304

ON BRIEF

Before THOMAS, JERRY SMITH, and LEVY, Administrative Patent Judges.

LEVY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-22¹.

BACKGROUND

¹ Claims 23-29 remain withdrawn from consideration based upon a restriction requirement that was included with the final rejection (Paper No. 5, mailed May 15, 1997). In addition, the amendment filed subsequent to the final rejection (Paper No. 6, mailed July 14, 1997) was denied entry by the examiner (Paper No. 7, filed July 30, 1997).

The appellants' invention relates to a high contrast, low noise alignment mark for laser trimming of redundant memory arrays. An understanding of the invention can be derived from a reading of exemplary claim 1², which is reproduced as follows:

1. An alignment mark structure formed on a silicon wafer comprising:

a base pad;

an anti-reflective-coating (ARC) layer over said base pad;

an insulative layer over said ARC layer; and

a patterned opening within said insulative layer. extending through said ARC layer, and terminating in said base pad.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Kitakata	4,642,672	Feb. 10, 1987
Tominaga	5,525,840	Jun. 11, 1996
		(Filed Nov. 9, 1994)
Oka	61-84824	Apr. 30, 1986

² We note that claim 1, line 6 erroneously includes a "." after the term layer (1st occurrence). We consider this to be a formality that can be addressed by the examiner subsequent to this appeal.

(Japanese Patent Application)

Admitted prior art (APA), Figures 1-4 and associated discussion in the specification.

Claims 1-8, 11-17, 19, and 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the APA in view of Oka and Tominaga.

Claims 9-10, 18, and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the APA, Oka, Tominaga, and further in view of Kitakata.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellants regarding the above-noted rejections, we make reference to the examiner's answer (Paper No. 10, mailed December 22, 1997) for the examiner's complete reasoning in support of the rejections, and to appellants' brief (Paper No. 9, filed October 16, 1997) for appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have carefully considered the subject matter on appeal, the

rejections advanced by the examiner, and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the brief along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the invention as set forth in claims 1-22. Accordingly, we reverse.

We consider first the rejection of claims 1-8, 11-17, 19, and 21-22 based on the combined teachings of the APA, Oka, and Tominaga. The examiner presents two alternative lines of reasoning.

In the first line of reasoning presented, the examiner's position (answer, pages 4 and 5) is that in Figures 2 and 3 of the APA, metal layer 18 corresponds to the claimed base pad, layer 20 corresponds to the claimed anti-reflective-coating, and that passivation layer 22 corresponds to the claimed

insulative layer. The examiner relies upon the teachings of Tominaga (Figure 3f) for an alignment mark formed by a recess or groove, and concludes that "it would have been obvious to form a groove for use as an alignment mark . . . because this is conventional as noted by Tominaga." Additionally, the examiner relies upon Oka's teaching of an accessory pattern in an insulating film, concluding that "it would have been obvious to form an alignment mark in the oxide film on the wiring layer in the prior art figures for the same reason, i.e., to save space."

In the alternative line of reasoning presented, the examiner considers the teachings of Oka in view of the APA and Tominaga, taking the position (answer, pages 5 and 6) that Oka teaches each layer recited in claim 1, with the exception of the anti-reflective-coating layer. The examiner relies upon Tominaga for a teaching of replacing the raised area of 18, 20 of Figure 2 of the APA with alignment marks formed by recesses or grooves, as taught by Tominaga (Figure 3f). According to the examiner, it would have been obvious to increase the visibility of the Oka mark by providing Oka with an ARC layer

below the oxide layer, in order to increase the visibility of the Oka mark.

Appellants assert (brief, pages 9-11) that there is no motivation to combine the teachings of the APA with Oka and Tominaga because in Oka, the pattern formed in the oxide layer on the metal layer is only for visual observation. In addition, Oka does not have an underlying ARC layer, but rather has a metal layer, resulting in a different step structure from that of appellants' invention. Appellants further assert that in Tominaga, the step of the alignment mark comprises an opaque conductive layer over a TiN layer, and that the TiN layer of Tominaga is used as a diffusion barrier layer and not as an ARC layer.

We find that in the APA, the alignment mark 36 shown in Figures 2 and 3, is a raised area. However, later in the manufacturing process, when the fuse access opening 34 and window outline 30 of the alignment mark are etched, alignment mark 36 has adjacent regions 32 that are deeply recessed, as shown in Figure 4. The APA teaches (pages 6 and 7) that the deep recesses harbor residues and other debris which cause severe noise in the laser alignment scan.

From the teachings of the APA, we do not agree with the examiner's statement (answer, page 4) that the proposed modification would have been obvious because it was conventional to form a groove for use as an alignment mark, as taught by Tominaga. The fact that alignment marks formed in grooves are within the scope and content of the prior art is not dispositive of the issue of whether the proposed modification would have been obvious to one of ordinary skill in the art. In view of the teaching of the APA that the deep recesses 32 harbor residues and other debris that are difficult to remove and cause severe noise in the laser alignment scan, we find that one of ordinary skill would have been taught away from forming the alignment mark in a recess because this would result in the alignment mark being closer to the bottom of the deeply recessed regions which harbor the residue and other debris.

In addition, to form the alignment mark 36 of Figure 3 of the APA in a recess or groove, not etch the deeply recessed regions 32 and 34, and then make a patterned opening in the passivation layer 22 and TiN layer 20 of the APA would result in a structure in which an access opening for fuse 40 would

not be created, because the APA teaches (Figure 4 and pages 5 and 6) that the access opening for fuse 34 and the deeply recessed regions 32 of the alignment site are etched at the same time. We find that the APA, Oka, and Tominaga would not have suggested this modification because the purpose of the alignment mark is for aligning the laser trimming tool. Without an access opening for the fuse to be severed by the laser trimming tool, we find no suggestion for the modification, other than from appellants' disclosure.

Moreover, from the teachings of the APA, Tominaga, and Oka, we find no suggestion to form alignment mark 36 of Figure 3 of the APA in a recess or groove, not etch the deeply recessed region 32, form a deep recess for access to the fuse 40 by the laser trimming tool, and make a patterned opening in the passivation layer 22 and TiN layer 20 of the APA to form an opening in the alignment mark 36 that forms a patterned opening within the insulative layer and extends through the ARC layer and terminates in the base pad.

Our reviewing court has stated that "[i]t is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the

prior art so that the claimed invention is rendered obvious." In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)(citing In re Gorman, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991)). Because of the diverse teachings of the APA, Tominaga, and Oka, we find no suggestion or teaching to form the alignment mark 36 of Figure 3 of the APA in a recess or groove and to provide an alignment mark in the insulating layer 22 and the TiN (ARC) layer 20, as advanced by the examiner.

Moreover, if the alignment mark 36 of the APA, including the deeply recessed regions 32, were replaced by the alignment mark of Figure 3f of Tominaga, the TiN film 5 would be covered by tungsten film 6, and not by an insulative layer as claimed. As there would be no insulative layer on the TiN layer, there would therefore be no way to make an alignment mark in an insulative layer in view of the teachings of Oka, as advanced by the examiner.

With regard to the second line of reasoning advanced by the examiner, from our review of the record, we find no suggestion to have provided Oka with an ARC layer under the insulative layer as shown in Figure 3 of the APA. We do not

agree with the examiner's statement (answer, page 6) that it would have been obvious to provide Oka with an anti-reflective-coating below the insulative layer in order to increase the visibility of the Oka mark. According to the examiner, since the mark is viewed in reflected light, one would want more light to reflect from the NEC pattern.

We find that in the APA (pages 4 and 5) the TiN ARC film 20 is applied over the metal layer "prior to the metal lithography to prevent radiation from the photoresist exposure from reflecting off the metal and exposing resist outside of the designated pattern." In Oka (Figures 1 and 2, and page 3), an opening is made in the CVD silicon oxide film 4 for a bonding pad. At the same time, accessory patterns, such as the letters NEC, are formed by removing film in the shape of the accessory patterns 5 from the oxide film 4 on wire 3. Oka discloses that in the prior art, patterns such as product names, manufacturing dates etc., had visibility problems due to miniaturization of the chips and their accessory patterns. In the prior art disclosed by Oka, wire 3 was etched to form the accessory patterns. However, large amounts of exposed wiring were not desirable. Oka's solution to this problem was

to form the accessory pattern in the oxide film 4 formed on the wire 3. While the proposed modification of Oka might result in better visibility of the accessory pattern, we find no suggestion for providing Oka with an ARC layer below the oxide layer, except from appellants' disclosure.

Our reviewing court has stated that "[the] mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 972 F.2d 1260, 1266 n.14, 23 USPQ2d 1780, 1783-84 n.14, citing In re Gordon, 773 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). As the APA, Oka and Tominaga do not suggest the desirability of placing an ARC layer between the insulative layer and the base pad to increase the visual observability of the patterned accessory, e.g., the characters NEC, we agree with appellants (brief, page 9) that "[w]hile the marks cited by **Oka** consists of a pattern in an oxide layer on a metal layer, it would not have been obvious at the time of **Oka** to insert an ARC layer beneath the oxide layer to form the marks which are only cited for visual observations."

Accordingly, we find that the examiner has failed to establish a prima facie case of obviousness with respect to the claimed invention. The rejection of claims 1-8, 11-17, 19 and 21-22 under 35 U.S.C. § 103(a) is therefore reversed.

With respect to dependent claims 9-10, 18, and 20, rejected under 35 U.S.C. § 103(a) as unpatentable over the APA, Oka, and Tominaga, and further in view of Kitakata, we find that Kitakata does not overcome the deficiencies of the basic combination of the APA, Oka, and Tominaga. Accordingly, the rejection of claims 9-10, 18, and 20 under 35 U.S.C. § 103(a) is therefore reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1-22 under 35 U.S.C. § 103(a) is reversed.

REVERSED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
JERRY SMITH)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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Appeal No. 1998-1548
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Page 14

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